UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,914	07/30/2003	Hans-Otto Scheck	60282.00111	6090

32294 7590 11/16/2006

SQUIRE, SANDERS & DEMPSEY L.L.P.
14TH FLOOR
8000 TOWERS CRESCENT
TYSONS CORNER, VA 22182

EXAMINER	
TU, JULIA P	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

p

Office Action Summary	Application No.	Applicant(s)	
	10/629,914	SCHECK, HANS-OTTO	
	Examiner	Art Unit	
	Julia P. Tu	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07/30/2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite because claims 1 and 11 recite the limitation "said input signals" in line 13, it is not clear whether "said input signals" are referred to first or second input signals.

Claim Objections

3. Claim 1 is objected to because of the following informalities: the examiner suggests to insert "on" between "based" and "said" in line 17 on the first page and line 2 on the second page. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3, 6-11, 13, 16-17, 19, 22-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozluturk et al. (US 6,377,620) in view of Sayegh (US 2005/0063487).

(1) with regard to claim 1:

As shown in figures 2, 3, and 5, Ozluturk et al. disclose a digital imbalance correction device, comprising input means adapted to receive first input signals (I-in, Q-in) containing a plurality of channels from an I/Q converter stage at respective input terminals, each input terminal being associated to a respective signal branch (21I and 21Q in figure 2),

computing the power spectrum of the first input signals (29I, 29Q, 33I, and 33Q in figure 2);

subtracting the power spectrum difference (37 in figure 2);

a cross-correlation means (block 75 in figure 3; column 4, lines 4-5) arranged to receive at its inputs third input signals based on the input signals, and to output a cross-correlation of the third input signals, the cross-correlation output being proportional to a phase error between the respective correlation input signals,

a gain correction means (blocks 25I and 25 Q in figure 2; column 3, lines 45-48) arranged in one of the respective signal branches and receiving at its input a fourth input signal based the associated first input signal.

a phase correction means (89, 93I, and 93Q in figure 3) arranged in one of the respective signal branch, wherein a phase of the input signal is corrected based on the cross-correlation output (column 4, lines 4-48), such that the phase of the input signal is in quadrature relation to the other one of the first input signals.

Ozluturk et al. disclose all of the above subject matters but is not explicit about computing the power spectrum of a signal employing an FFT.

However, one of ordinary skill in the art would recognize that computing the power spectrum using an FFT is well-known in the art as it is evidenced by Sayegh (page 3, paragraph 0053). Therefore, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to compute the power spectrum using an FFT to give very precise information of the frequency plan of the communication system (page 3, paragraph 0039).

(2) with regard to claim 3:

Ozluturk et al. further teach the gain correction means comprises controllable amplifier element (25I and 25 Q in figure 1, column 2, lines 64-66).

(3) with regard to claim 6:

Ozluturk et al. further teach in one of the branches (Q) the first signal equals the third input signal, while in the other of the signal branch (I) the first signal equals the

fourth input signal, the third input signal equals the fifth input signal, with the third and the fifth input signals being equal to the gain-corrected fourth input signal (figures 2 and 3).

(4) with regard to claim 7:

Ozluturk et al. further teach in one of the signal branch (Q) the first input signal equals the third input signal, while in the other of the signal branch (I) the first input signal equals the third and the fourth input signal, and the fifth input signal equals the gain-corrected fourth input signal (figures 2 and 3).

(5) with regard to claim 8:

Ozluturk et al. further teach in one of the signal branches (Q) the first input signal equals the third input signal, while in the other of the signal branches (I) the first input signal equals the third and the fifth input signal, and the fourth input signal equals the phase-corrected fifth input signal (figures 2 and 3).

(6) with regard to claim 9:

Ozluturk et al. further teach the gain correction means and the phase correction means are arranged in the same respective signal branch (figure 5).

(7) with regard to claim 10:

Ozluturk et al. further teach the gain correction means and the phase correction means are arranged in respective different ones of said signal branches (figures 2 and 3).

(8) with regard to claim 11:

As shown in figures 2, 3, and 5, Ozluturk et al. disclose a digital imbalance correction method, comprising step of inputting first input signals (I-in, Q-in) containing a plurality of channels from an I/Q conversion (21I and 21Q in figure 2),

computing the power spectrum of the first input signals (29I, 29Q, 33I, and 33Q in figure 2);

subtracting the power spectrum difference (37 in figure 2);

performing a cross-correlation (block 75 in figure 3; column 4, lines 4-5) based on the input signals, and to output a cross-correlation of the third input signals, the cross-correlation output being proportional to a phase error between the respective correlation input signals,

performing gain correction (blocks 25I and 25 Q; column 3, lines 45-48) for the input signals.

Performing a phase correction (89, 93I, and 93Q) for the input signals based on the cross-correlation (column 4, lines 4-48) such that the phase of the input signal is in quadrature relation to the other one of the first input signals.

Ozluturk et al. disclose all of the above subject matters but is not explicit about computing the power spectrum of a signal employing an FFT.

However, one of ordinary skill in the art would recognize that computing the power spectrum using an FFT is well-known in the art as it is evidenced by Sayegh (page 3, paragraph 0053). Therefore, it would have been obvious to one of ordinary

skilled in the art at the time the invention was made to compute the power spectrum using an FFT to give very precise information of the frequency plan of the communication system (page 3, paragraph 0039).

(9) with regard to claim 13:

Ozluturk et al. further disclose the gain correction step comprises controlling an amplification (25I and 25Q in figure 2).

(10) with regard to claim 16:

As shown in figures 2, 3, and 5, Ozluturk et al. disclose A digital imbalance correction device, comprising:

an input unit configured to receive first input signals (I-in, Q-in) (21I and 21Q in figure 2),

computing the power spectrum of the first input signals (29I, 29Q, 33I, and 33Q in figure 2);

subtracting the power spectrum difference (37 in figure 2);

a cross-correlator (block 75 in figure 3; column 4, lines 4-5) arranged to receive at its inputs third input signals based on the input signals, and to output a cross-correlation of the third input signals, the cross-correlation output being proportional to a phase error between the respective correlation input signals,

a gain corrector (blocks 25I and 25 Q; column 3, lines 45-48) arranged in one of the respective signal branches and receiving at its input a fourth input signal based the associated first input signal.

a phase corrector (89, 93I, and 93Q) arranged in one of the respective signal branch, wherein a phase of the input signal is corrected based on the cross-correlation output (column 4, lines 4-48), such that the phase of the input signal is in quadrature relation to the other one of the first input signals.

Ozluturk et al. disclose all of the above subject matters but is not explicit about computing the power spectrum of a signal employing an FFT.

However, one of ordinary skill in the art would recognize that computing the power spectrum using an FFT is well-known in the art as it is evidenced by Sayegh (page 3, paragraph 0053). Therefore, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to compute the power spectrum using an FFT to give very precise information of the frequency plan of the communication system (page 3, paragraph 0039).

(11) with regard to claim 17:

Ozluturk et al. disclose the first input signals comprise a plurality of channels from and I/Q converter stage at respective input signals (21I and 21Q in figure 2).

(12) with regard to claim 19:

Ozluturk et al. further disclose the gain correction step comprises controlling an amplification (25I and 25Q in figure 2).

(13) with regard to claim 22:

Ozluturk et al. further teach in one of the branches (Q) the first signal equals the third input signal, while in the other of the signal branch (I) the first signal equals the fourth input signal, the third input signal equals the fifth input signal, with the third and the fifth input signals being equal to the gain-corrected fourth input signal (figures 2, 3, and 5).

(14) with regard to claim 23:

Ozluturk et al. further teach in one of the signal branches (Q) the first input signal equals the third input signal, while in the other of the signal branches (I) the first input signal equals the third and the fifth input signal, and the fourth input signal equals the phase-corrected fifth input signal (figures 2, 3, and 5).

(15) with regard to claim 25:

Ozluturk et al. further teach the gain corrector and the phase corrector are arranged in the same signal branch (figure 5).

(16) with regard to claim 26:

Ozluturk et al. further teach the gain corrector and the phase corrector are arranged in different signal branches (figures 2, 3, and 5).

(17) with regard to claim 27:

As shown in figures 2, 3, and 5, Ozluturk et al. disclose a digital imbalance correction device, comprising:

an input unit configured to receive first and second input signals (I-in, Q-in) (21I and 21Q in figure 2),

a subtractor configured to receive the power spectra and to output a gain difference (block 37 in figure 2)

a cross-correlator configured to receive the second input signal and to output a cross-correlation of the second input signal (block 75 in figure 3; column 4, lines 4-5)

a gain corrector (blocks 25I and 25 Q, block 17 in figure 5; column 3, lines 45-48) configured to receive the first input signal and to correct a gain of the first input signal so that the gain of the first input signal equals the gain of the second input signal

a phase corrector (89, 93I, and 93Q in figure 3; 61 in figure 5) configured to receive the corrected first input signal, and to correct a phase of the corrected first input signal using the cross-correlation output (column 4, lines 4-48) so that the phase of the input signal is in quadrature relation to the other one of the first input signals.

Ozluturk et al. disclose all of the above subject matters but is not explicit about computing the power spectrum of a signal employing an FFT.

However, one of ordinary skill in the art would recognize that computing the power spectrum using an FFT is well-known in the art as it is evidenced by Sayegh (page 3, paragraph 0053). Therefore, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to compute the power spectrum using an FFT to give very precise information of the frequency plan of the communication system (page 3, paragraph 0039).

6. Claims 2, 12, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozluturk et al. (US 6,377,620) in view of Sayegh (US 2005/0063487) as applied to claims 1, 11, and 16 above, and further in view of Spagnoletti et al. (6,151,356).

Ozluturk et al. and Sayegh disclose all of the subject matters as applied to claim 1 above except for the phase correction means comprises controllable delay elements.

However, Spagnoletti et al. disclose the phase correction means comprises controllable delay elements (column 6, lines 63-67).

One skilled in the art would have recognize that including controllable delay elements in the phase correction to keep the phase difference within acceptable limits (column 1, lines 47-48). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include controllable delay elements in the phase correction to effectively bring to two signals back into alignment (column 3, lines 9-10) in order to provide better performance of the communication system.

7. Claims 4, 14, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozluturk et al. (US 6,377,620) in view of Sayegh (US 2005/0063487) as applied to claims 1, 11, and 16 above, and further in view of Boulanger et al. (US 2006/0133459).

Ozluturk et al. and Sayegh disclose all of the subject matters as applied to claim 1 above except for the input means comprise analog-to-digital converter means adapted to covert analog input data to digital data.

However, Boulanger et al. disclose the input means comprise analog-to-digital converter means adapted to covert analog input data to digital data (figure 1, page 2, paragraph [0039]).

It is desirable to include an analog-to-digital converter to convert analog input data to digital data to obtain the maximum signal to noise ratio. Therefore, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to include an analog-to-digital converter to convert analog input data to digital data improve the accuracy of the communication system.

8. Claims 5, 15, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozluturk et al. (US 6,377,620) in view of Sayegh (US 2005/0063487) as applied to claims 1, 11 and 16 above, and further in view of Schmutz (US 6,262,981).

Ozluturk et al., Yamanaka et al., and Srinivasan et al. disclose all of the subject matters as applied to claim 1 above except for a channelizer means arranged to receive at its respective inputs the phase-corrected and gain-corrected signals based on the first input signals associated to the respective signal paths and adapted to demodulate the signals into the respective individual channels.

However, Schmutz disclose a channelizer means arranged to receive at its respective inputs the input signals associated to the respective signal paths and adapted to demodulate the signals into the respective individual channels (figure 2; column 5, lines 48-60).

One skilled in the art would have recognize that including a channelizer means arranged to receive at its respective inputs the input signals associated to the respective signal paths and adapted to demodulate the signals into the respective individual channels so that the communication system will be economically desirable to accommodate more system users while maintaining a reasonable power level user (column 2, lines 36-38). Therefore, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to include a channelizer means arranged to receive at its respective inputs the input signals associated to the respective signal paths and adapted to demodulate the signals into the respective individual channels as taught by Schmutz to the system as taught by Ozluturk et al., Yamanaka et al., and Srinivasan et al. in order for the communication system will be economically desirable to accommodate more system users while maintaining a reasonable power level user (column 2, lines 36-38).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamanaka et al. (US 7,116,733) disclose an automatic gain control circuit of a demodulating circuit, power values of pieces of symbol information I and Q of in-phase components and quadrature components of a modulated signal. Suominen (US 2006/0019624) disclose phase correction includes delay correction and amplitude correction between the I and Q signals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julia P. Tu whose telephone number is 571-270-1087. The examiner can normally be reached on 7:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

J.T.
11/06/2006

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER